a marsh invariably are flowering plants, such as *Menyanthes*, *Comarum*, *Cicuta*, *Equisetum*, *Carices*, and the like. Their roots and underground stems make a thickly-woven floating carpet, which soon totally conceals the water. The *Sphagnum* invades this floating carpet, while the water beneath becomes filled with *débris* of decaying plants, transformed later on into peat-bog. In shallow basins the transformation goes on at a much speedier rate, as their bottoms are invaded by plants like *Phragmites* and *Scirpus lacustris* which reach a considerable height, and thus supply, after their decay, a good deal of additional material for the filling up of the basin. A mass of smaller plants, such as *Lemna*, *Hydrocharis*, *Callitriche*, *Utricularia*, *Hypnum fluitans*, and several others, usually grow also amidst the rushes. Of course, the streamlets which flow into the basin contribute also to fill it up by bringing in sand and loam. As soon as the floating carpet has reached a certain thickness, and the *Sphagnum* has still more increased its bulk, various plants, such as *Drosera*, *Vaccinium*, *Eriophorum*, the dwarf birch, and other bushes, begin to grow upon it, although the space beneath still remains filled with water. As the *Sphagnum* does not grow upon ponds containing a chalky water, its place in such ponds is mostly taken by the *Hypnum*, and in these cases a variety of other plants, such as *Typha*, *Stratiotes*, *Butomus*, *Ranunculus divaricatus*, and *Chara fragilis*, make their appearance. As to the *Sphagnum*, it invades wet meadows as well.

AT a recent meeting of the French Academy of Sciences, M. de Malarce, speaking of the extension of the metric system of weights and measures, gave some interesting figures. In 1887 the aggregate population of the countries in which the metric system was compulsory was over 302,000,000, being an increase of 53,000,000 in ten years. In 1887, in countries with a population of close on 97,000,000, the use of the system was optional ; and the countries where the metric system is legally admitted in principle and partially applied (as in Russia, Turkey, and British India) had in 1887 a population of 395,000,000, being an increase of 54,000,000 in ten years. The increase is due to the growth of population in the countries which had already adopted the system, and to its adoption by new countries. The systems of China, Japan, and Mexico, are decimal, but not metric. The metric system is thus legally recognized by 794,000,000 of people, and the three last-named countries have a population of about 474,000,000. So that only about 42,000,000 of inhabitants of the civilized world have systems which are neither metric nor decimal.

SIR ARTHUR NICOLSON, the British Consul at Buda-Pesth, in his last Report on Hungary, referring to technical education in that country, says that it will afford an indication of the attention which is being paid to this important question to instance the steps which have been taken in Buda-Pesth in regard to primary technical education. By paragraph 80 of the Trade Law of 1884, every *commune*, where there are fifty or more apprentices, is bound to provide for their education, and to afford special courses of instruction. The apprentice schools in Buda-Pesth contain a preparatory class, provide a course of three years, and are chiefly destined to educate apprentices for the higher trade schools. Each district of the town must have at least one apprentice school. No class is to comprise more than fifty pupils, or at most sixty pupils ; and should the number of pupils be larger, parallel classes can be established. A pupil passes at the end of each year into a higher class if he can show proficiency and good progress. Theoretical instruction is given six hours in the week, and drawing and modelling are taught five hours weekly, on Sundays. The first schools were established in 1887, and numbered 12 with 125 teachers. There were 42 classes, or, including the parallel classes, 93, attended by 5173 pupils. In 1888 the number of schools had risen to 16, the number of classes to 127, the staff of teachers 151, and the number of pupils to 6459. In the other towns and counties of Hungary there were 229 apprentice schools, with 1237 teachers, and 38,081 pupils. For all these schools, including those of the capital, the *communes* contribute in florins 214,302 ; private individuals, 1387 ; Chambers, 680 ; counties, 9080 ; State, 35,806 ; fees and fines, 129,488 ; making a total of 390,843 florins.

THE British Consul at Ancona, in his last Report, refers to a School of Practical Agriculture established in Fabriano in 1882. It is subsidized by the Government, the province of Ancona, the municipality of Fabriano, and the local Chamber of Commerce. The school has a Director, two Professors, and a Teacher of Practical Agriculture. The course of study is spread over three years as follows : first year, Italian, geography, elements of natural history, elementary arithmetic, agronomy, and writing ; second year, Italian, geography, elements of natural philosophy and chemistry, agriculture, and rural accounts ; third year, horticulture, rural direction and management of a farm, technical agriculture, and arithmetic. The school at present has thirty-six scholars, of whom nineteen are in the first year, nine in the second, and eight in the third. Of these, twelve are agriculturists, ten sons of land stewards, eleven sons of gentlemen, and three sons of tradesmen. The day's work begins at 5.30 a.m. in winter, and is over at 8 p.m. Seven hours are devoted to practical work, five to study, the remainder being allowed for meals and recreation. In summer the students rise at 4.30 a.m. ; otherwise, with the exception of an extra hour and a half for recreation, the studies are carried on as in winter.

THE additions to the Zoological Society's Gardens during the past week include two Australian Thicknees (*Œdicnemus grallarius*), an Eyton's Tree Duck (*Dendrocygna eytoni*) from Australia, two Lineated Parrakeets (*Bolborhynchus lineolatus*) from Mexico), two Senegal Touracous (*Corythaix persa*) from West Africa, purchased ; two Elliot's Pheasants (*Phasianus ellioti* ♂ ♀) from China, deposited ; a Hog Deer (*Cervus porcinus* ♀), two Mule Deer (*Cariacus macrotis* ♀ ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

STONYHURST COLLEGE OBSERVATORY.—The results of the observations made during the year 1888 at this Observatory have recently been published in the ususal form. The bulk of the volume is occupied with the routine magnetic and meteorological observations, and an appendix gives the meteorological results for St. Ignatius College, Malta. The weather in 1888 was less favourable for the daily delineation of the solar surface than in 1887, but 223 full-sized drawings were secured. The daily areas of sun-spots derived from these show very strikingly, especially as given in graphical form, the nearness of our approach to minimum. The chromosphere was completely examined on eighty-four days, and partly on three other dates. The most important event of the year in connection with the Observatory has been the installation of a large grating-spectroscope for the especial purpose of photographing the solar spectrum, and the spectra of sun-spots in particular—a work which, in the present state of solar physics, greatly needed to be undertaken, and carried out with persevering regularity. The grating is a flat one, by Rowland, of 14,438 lines to the inch, and 3½ inches in length. It is to be used in connection with a heliostat and a 5½-inch object-glass by Alvan Clark. The preliminary experiments promise well for its efficiency, and the Director of the Observatory is to be greatly congratulated on so valuable an addition to his equipment.

The Rev. E. Colin, S.J., who spent the last year at Stonyhurst Observatory, has just been appointed Director of the French Government Observatory at Antananarivo.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 JUNE 16–22.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

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At Greenwich on June 16

Sun rises, 3h. 44m.; souths, 12h. 0m. 26·5s.; daily increase of southing, 12·8s.; sets, 20h. 17m.: right asc. on meridian, 5h. 40·2m.; decl. 23° 22′ N. Sidereal Time at Sunset, 13h. 58m.

Moon (at Last Quarter on June 20, 8h.) rises, 22h. 31m.*; souths, 2h. 35m.; sets, 6h. 44m.: right asc. on meridian, 20h. 13·2m.; decl. 21° 39′ S.

Planet.	Rises.		Souths.		Sets.		Right asc. and declination on meridian.			
	h.	m.	h.	m.	h.	m.	h.	m.	°	′
Mercury..	4	25	12	20	20	15	5	59·8	20	14 N.
Venus ...	1	55	9	4	16	13	2	43·7	12	45 N.
Mars ...	3	41	12	2	20	23	5	42·1	24	4 N.
Jupiter ...	20	47*	0	42	4	37	8	19·6	23	11 S.
Saturn ...	8	5	15	38	23	11	9	18·1	16	55 N
Uranus...	13	55	19	26	0	57*	13	7·0	6	27 S.
Neptune..	2	37	10	25	18	13	4	4·7	19	11 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

June.	h.	
18	2	Mars in conjunction with the Sun.
19	11	Mercury in inferior conjunction with the Sun.
21	6	Sun at greatest declination north; longest day in northern latitudes.

Variable Stars.

Star.	R.A.		Decl.			h.	m.	
	h.	m.	°	′				
U Cephei	0	52·5	81	17 N.	June 19,	22	47	*m*
V Boötis	14	25·3	39	21 N.	,, 16,			*m*
δ Libræ	14	55·1	8	5 S.	,, 17,	21	15	*m*
V Ophiuchi	16	20·6	12	10 S.	,, 16,			*M*
U Ophiuchi	17	10·9	1	20 N.	,, 17,	0	53	*m*
					and at intervals of	20	8	
X Sagittarii	17	40·6	27	47 S.	June 16,	22	0	*M*
					,, 21,	1	0	*m*
W Sagittarii	17	57·9	29	35 S.	,, 19,	0	0	*m*
Y Sagittarii	18	14·9	18	55 S.	,, 18,	1	0	*m*
T Serpentis	18	23·4	6	14 N.	,, 22,			*M*
R Scuti	18	41·6	5	50 S.	,, 18,			*m*
η Aquilæ	19	46·8	0	43 N.	,, 21,	2	0	*m*
T Vulpeculæ	20	46·8	27	50 N.	,, 20,	22	0	*m*
					,, 22,	0	0	*M*
δ Cephei	22	25·1	57	51 N.	,, 17,	2	0	*M*

M signifies maximum; *m* minimum.

Meteor-Showers

	R.A.	Decl.	
Near β Ursæ Majoris	170°	55° N.	
From Vulpeculæ	285	23 N.	Rather slow.
Near ε Cephei	335	57 N.	Swift.

GEOGRAPHICAL NOTES.

SIG. GIULIO BORELLI writes from Cairo to the May number of the Italian Geographical *Bollettino*, on the outflow of the River Omo, in connection with Count Teleki's recent discovery of Lake Rudolf (Samburu). Combining the data supplied by this explorer and his comrade, Lieutenant Hoenel, with his own observations further north, he finds that the Omo is a tributary neither of the White Nile nor of the Juba, as hitherto supposed, but almost certainly flows south to Lake Rudolf. But at its confluence with the Gojieb, south of Shoa, the Omo flows at an altitute of 1100 metres, about the same or very little more than that of Victoria Nyanza; and as beyond the confluence it has still a very long and rapid course, it follows that it cannot be a tributary of the great equatorial lake. Lake Rudolf stands at an elevation of about 550 metres, showing a fall of over 500 metres from the Gojieb confluence in a space of four degrees of latitude. Hence this basin, with its Omo feeder, can have no connection with the Nile, and, as asserted by its discoverers, is in fact a flooded depression without any outlet. Thus would appear to be solved one of the last hydrographical problems on the African continent.

AT the last meeting of the Russian Geographical Society it was definitely announced that the Society had decided to take part in the Geographical Congress which is to be held at Paris during the Exhibition. At the same meeting, Colonel Nadaroff communicated some interesting facts about the South Usuri region. It appears that the level of the great Lake Khangka, at the sources of the Usuri, has fallen to a considerable extent since the Russian occupation of the country thirty years ago. Even a hasty glance over the region of the Lower Amur and its tributaries, surrounded by numberless lakes, shows that the river-beds of the region belong to what Peschel described as "young rivers"—that is, rivers which have not yet completed the excavation of definite beds. It is natural, therefore, to suppose that the lakes which surround the Lower Amur must by and by be emptied into the channel of the great river, and thus in the meantime gradually diminish in size. M. Nadaroff's statement tends to confirm this view, and adds new facts in support of the theory of the rapid desiccation of Northern Asia.

AT the meeting of the Physical Section of the Russian Geographical Society on May 10, General Tillo made a communication about his remarkable hypsometrical map of European Russia, for which he has collected all available data obtained by levellings for the building of railways and along Russian rivers, as well as for the draining of marshes, together with data furnished by the trigonometrical survey of Russia and by individual explorers.

THE PRIORITY OF CHINESE INVENTIONS.

A WRITER in the *North China Herald* of Shanghai, referring to the Chinese claims to have originated many modern Western scientific inventions, says that Chinese patriotism has exhibited itself in an ardent desire to claim priority over Europeans in this respect. They are a very ingenious people, and, in past times having invented many valuable implements, it has always seemed to them a fair hypothesis that as every machine is an improvement on something that preceded it, the machinery and telescopes of the West may have originated at first in something Chinese. Yuen-yuen, a former Governor-General of Canton, in his "History of Astronomers," written at the beginning of this century, again prominently brought forward the idea that European mathematics came from China, and many subsequent writers have made the same claim. Not only is this the case in mathematics, but the Chinese say that our telescopes, steam-engines, firearms, and cannons are owing to them. Ever since China first saw steamers, fifty years ago, and since she came to know of the existence of European mathematics three hundred years ago, she has, from time to time, with more or less eagerness shown herself bent on claiming that the knowledge and skill shown in the West began in the first place with China. Mei-wen-ting, a great Chinese scholar, who died at an advanced age in the year 1722, after considering the whole question from the Chinese point of view, came to the conclusion that Europeans had got their mathematics and science from China. Amongst other reasons for this belief he states that in the "Chon-pi," a mathematical work of about B.C. 1100, although not expressly stated, the rotundity of the earth is implied. In the same book are to be found, he says, the properties of a right-angled triangle, as, for instance, that the square of the hypotenuse is equal to the sum of the squares of the other two sides. Since this is a fundamental problem, Mei-wen-ting claims that Western geometrical and trigonometrical knowledge is due to China. He accounts for the spread of Chinese astronomy to us by the scattering of the schools of astronomy in China, which, according to Szu-ma-chien, an historian who wrote a century before the Christian era, took place about B.C. 760. The fugitive astronomers, flying from the tyranny of the early Chow dynasty, diffused Chinese learning amongst the barbarians. Similarly in other matters the Chinese claim that the metaphysics of Indian Buddhism are due to the journey of Lao-tse to the West. The writer concludes his interesting discussion as follows:—"We need not trouble ourselves much respecting the Chinese claim to have originated Western science: they only claim to have started the preliminary ideas. As to the Chinese having always had enlightened views on many scientific and political subjects, we may frankly admit it. They speak 2200 years ago of concave and convex mirrors being able to magnify objects. Four thousand years ago they had instruments for observing the stars. In the year A.D. 1122 they made use of the magnet pointing to the south on board ship to guide the vessel on her course. With the proviso that they may have derived some of their early knowledge in these things and in others, such as the manufacture of fireworks, from foreign

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